	Application No.	Applicant(s)	
Notice of Allowability	10/730,902	FUKUSHIMA ET AL.	
	Examiner	Art Unit	
	Evan Pert	2826	
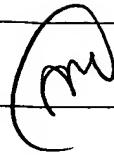
-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION·ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to *the application filed December 10, 2003*.

2. ☒ The allowed claim(s) is/are *1-20*.

3. ☒ The drawings filed on *10 December 2003* are accepted by the Examiner.

4. ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a) ☒ All   b) ☐ Some*   c) ☐ None   of the:

        1. ☒ Certified copies of the priority documents have been received.

        2. ☐ Certified copies of the priority documents have been received in Application No. _____ .

        3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

    * Certified copies not received: _____ .

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.

6. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.

    (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached

        1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.

    (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.

    Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).

7. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☒ Notice of References Cited (PTO-892)

2. ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)

3. ☒ Information Disclosure Statements (PTO-1449 or PTO/SB/08), Paper No./Mail Date *1203*

4. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material

5. ☐ Notice of Informal Patent Application (PTO-152)

6. ☐ Interview Summary (PTO-413), Paper No./Mail Date _____ .

7. ☒ Examiner's Amendment/Comment

8. ☒ Examiner's Statement of Reasons for Allowance

9. ☐ Other _____.

EXAMINER'S AMENDMENT

1.   An examiner's amendment to the record appears below. Should the changes

and/or additions be unacceptable to applicant, an amendment may be filed as provided

by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be

submitted no later than the payment of the issue fee.

The application has been amended as follows:

- Change the title to --Method of Making Semiconductor Device By

    Polishing with Intermediate Clean Polishing--.

- In the specification, delete lines 3-8 [as being redundant over field [30] of the

    patent, wherein *essential* subject matter not in the US filing should only be "incorporated

    by reference" if made of record in English].

Allowable Subject Matter

2.   Claims 1-20 are allowed.

3.   The following is an examiner's statement of reasons for allowance:

The prior art does not disclose or suggest applicant's claimed method,

particularly characterized by a "first polishing" and "second polishing" of "a film" with (an

intervening) "clean polishing" (e.g. clean polishing with the polishing machine).

For example, in a Cu CMP process part of a process of making a semiconductor

device, starting at Fig. 1A, an additive 15 in "a film" 14 to be polished is removed in a

"first polishing" to get the structure of Fig. 1B, which is then subjected to "clean

polishing," followed by a "second polishing" to get the structure of Fig. 1C.

Applicant's method improves surface uniformity in a CMP process, especially

when an additive 15 is included in the film to be polished.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Conclusion

4.   The prior art made of record and not relied upon is considered pertinent to applicant's disclosure:

US 2002/0048958 A1 is cited for disclosing a first a second polishing, and addresses cleaning and washing between the first and second polishing, yet the first and second polishing are not on the same film (i.e. "a film"), as claimed, since the first polishing is of the entire Cu film 205 [Fig. 2A], while the second polishing is of the barrier film 203 [i.e. second polishing converts structure in Fig. 2B to structure in Fig. 2C, such that the second polishing is not actually a polishing of "a film" which was subjected to first polishing].

Similarly to the '958 document above, US 6,855,035 shows fist and second polishing of a Cu film and barrier film (which are not "a film") [Fig. 2].

US 6,783,432 shows an additive for the second polishing of the barrier film 312 [Figs. 3-4].

US 6,720,264 explains the conventional "first" and "second" steps of polishing as polishing the Cu film 14 down to the barrier film 10, followed by a second polishing of the barrier film 10, with additives to improve polishing uniformity.

US 6,645,550 B1 discloses clean and rinse steps following CMP steps, but does not suggest diving a CMP step on "a film" into "first" and "second" steps of polishing with an intervening "clean polishing."

US 6,194,317 B1 discloses multiple steps of polishing for planarization of an uneven topography of a semiconductor wafer having in-process devices, yet does not disclose the "clean polishing" of applicant's claimed invention.

US 6,143,656 shows a Cu film 22, and barrier 14, with multiple polishing steps, yet the multiple polishing steps are not "a film" (i.e. the same film).

US 6,099,662 discloses rinsing with distilled water after CMP, but does not disclose "clean polishing" between "first polishing" and "second polishing" of "a film" (i.e. the same film).

US 5,664,990 discloses the use of water in recovery of CMP solution, but not "clean polishing."

US 5,643,406 discloses polishing with ionized water having a variable pH, but not "clean polishing" between a "first polishing" and a "second polishing" of "a film" (i.e. the same film).

5.   Any inquiry concerning this communication or earlier communications from the examiner should be directed to Evan Pert whose telephone number is 571-272-1969. The examiner can normally be reached on M-F (7:30AM-3:30 PM).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nathan Flynn can be reached on 571-272-1915. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the

Patent Application Information Retrieval (PAIR) system. Status information for

published applications may be obtained from either Private PAIR or Public PAIR.

Status information for unpublished applications is available through Private PAIR only.

For more information about the PAIR system, see http://pair-direct.uspto.gov. Should

you have questions on access to the Private PAIR system, contact the Electronic

Business Center (EBC) at 866-217-9197 (toll-free).

ETP
July 23, 2005

**EVAN PERT
PRIMARY EXAMINER**

\